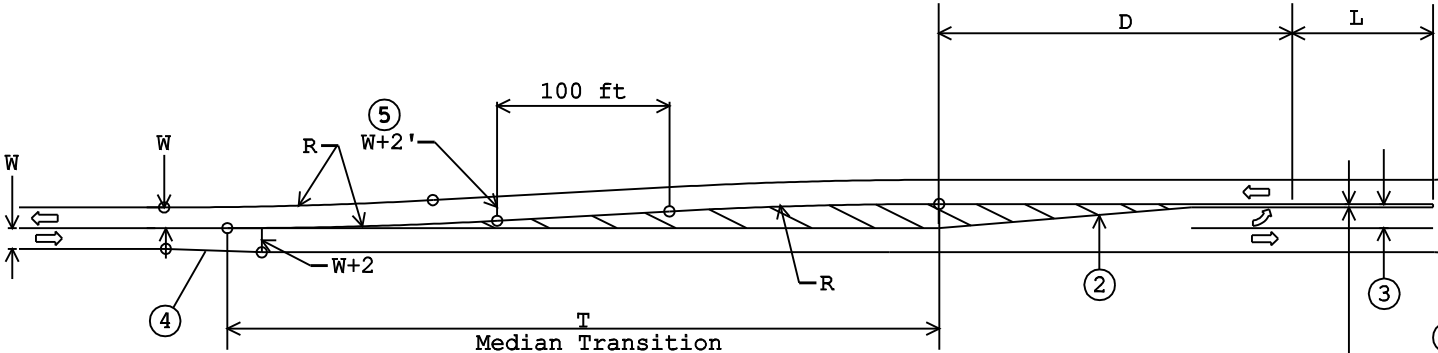
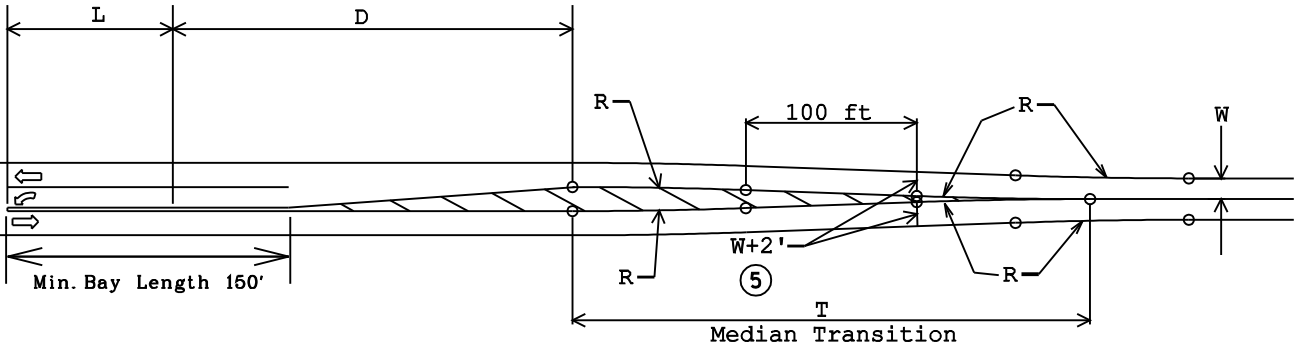


Typical Left Turn Lane Design\* - Permanent Construction  
No Superelevation Required

Asymmetrical Widening



Symmetrical Widening



① Turnout radius - Turnouts should be designed to accommodate the vehicle path of the chosen design vehicle. Typical design vehicles are WB-50 for state route intersections, WB 62 for designated truck routes, P vehicle on non-state routes in urban areas, and SU for non-state routes in rural areas. Turnouts on Multilane routes with a large truck as the design vehicle can be designed to accommodate the truck turning into either lane.

2' min. stripe (AASHTO page 716) or  
3' min. w/raised divider (2'w/1' thru lane offset)

② Turn lane taper length.  
Typical length is 13.75:1. In constrained urban areas 100' single lane and 150' dual lane tapers are allowed. (AASHTO pg 715)

L (Storage length) formulas.  
signalized intersection  $L = 1.5 \times (\text{average design year queue}) \times 25'$ . (AASHTO pg 715)  
unsignalized intersections  $L = (\text{veh/min}) \times 2 \times 25' \times 1.5 (1 + \frac{\% \text{ Trucks}}{100})$ . (AASHTO pg 714)

Minimum provisions should be made to store at least 2 vehicles if the storage lengths results in less than a 2 vehicle queue. (AASHTO pg 715)

A 30' minimum width is required on the receiving road of a double left (NCHRP 420 page 90, AASHTO page 722)

Concurrent opposing left turns should have at least 10' of vehicle clearance between them (NCHRP 225 page 23 and NCHRP 299 page 87).

- ③ Turn lane width may be a minimum of 10' (AASHTO pages 433, 472, 714, 716) on urban roadways if  $T\% < 10\%$ . Otherwise turn lane width = W
- ④ Lane Width Transition Taper.  
 $(W \times D.S.^2)/60$  for  $D.S. < 40$  mph  
 $W \times D.S.$  for  $D.S. > 45$
- ⑤ Additional through lane widening is not required on multi lane routes and 2 lane routes with adequate shoulders. On low speed roadways, the 2' specified widening for each through lane (4' total) may be reduced to 1' in each direction (2' total). (AASHTO pg 565-566)

The criteria for grades approaching an intersection are different from those for open highways as shown on the design standards. Grades in excess of 3% should be avoided in the vicinity of intersections (defined as D + L distance). Grades up to 6% allowed as a minimum condition (AASHTO pg 582).

Design Speed (mph)	R Rounded (ft)	Degree of curve	D (ft)	T (ft) distances are approximated	
				Symmetrical (7' Shift)	Asymmetrical (14' Shift)
30	1950	3°	105	255	345
35	2300	2°30'	165	273	373
40	2900	2°	235	302	415
45	3850	1°30'	280	344	475
50	5750	1°	320	414	576
55	11500	0°30'	385	576	809
60	11500	0°30'	435	576	809

R = Radius of reversing curve.  
D = Deceleration distance from design speed minus 10 mph. to be adjusted according to Exhibit 10-71 from AASHTO if grade >3%.

\* Turn Lanes on Curved Alignments Should Be Designed On A Case By Case Basis

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